(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 928 087 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.07.1999 Bulletin 1999/27

(51) Int. Cl.[6]: **H04L 12/44**, H04L 29/14

(21) Application number: **98403041.1**

(22) Date of filing: **04.12.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **05.12.1997 JP 33576597**

(71) Applicant:
Sumitomo Wiring Systems, Ltd.
Yokkaichi-City, Mie, 510-8503 (JP)

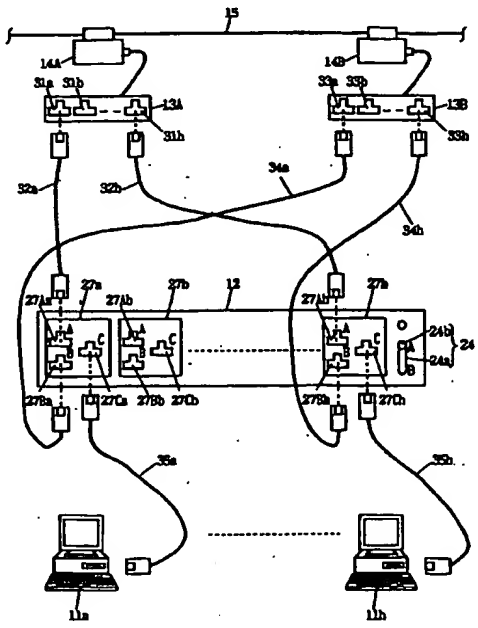
(72) Inventor:
Kondo, Naohiro,
c/o Sumitomo Wiring Systems, Ltd.
Yokkaichi-City, Mie 510-8503 (JP)

(74) Representative:
Bertrand, Didier et al
Cabinet FEDIT-LORIOT
38, Avenue Hoche
75008 Paris (FR)

(54) Devices for switching over electrical connections

(57) A device (12) for switching over hub units is connected to a first hub unit (13A) or a second hub unit (13B) in an electrically interchangeable manner on one hand, and adapted to connect to a plurality of terminal apparatuses (11 a to h) on the other. The device and the first and second hub units respectively contain an equal number of device ports (27 a to h), first hub ports (31 a to h) and second hub ports (33 a to h) for entering or emitting data signals. The device for switching over hub units further comprises a unit-conversion switch (24). The device ports each contain a first connector (A) connected to a first hub port via a first cable (32 a to h), a second connector (B) connected to a second hub port via a second cable (34 a to h) and a third connector (C) adapted to connect to a terminal apparatus via a third cable (35 a to h) respectively. The device ports further contain switching elements for connecting the third connectors either to the first connectors or to the second connectors. All the switching elements are controlled by the unit-conversion switch, such that all the third connectors are switched over either to the first connectors or to the second connectors.

Fig.4



EP 0 928 087 A1

Description

[0001] The present invention relates to the field of local area network (designated hereinafter as LAN) and to a unit for assembling electric cables (designated as 'hub' unit) used in network LAN. The invention concerns in particular a device for switching over hub units, a wiring system comprising this device, and a method of using this device.

[0002] Recent developments of communications technology such as computer networks has increased the constructions of network LAN which connects the terminals of computers or their peripherals to one another in rooms or buildings. The network LAN includes a 'peer-to-peer' system, as shown in Fig.1, in which data are exchanged between terminal apparatuses 1 on the same ranking basis. It also includes a 'client-server' system, as shown in Fig.2, in which a plurality of terminal apparatuses 1 (client apparatuses) are connected to a server 2 which executes administrative functions. In both cases, a hub unit 4 is set up for assembling a plurality of electric cables 3.

[0003] The hub unit 4 is prerequisite for putting into practice a star-type wiring system in network LAN which includes system 10BASE-T. It assembles twisted paired wire cables 3 extending from all terminal apparatuses 1 and controls their network.

[0004] When hub unit 4 breaks down, a special maintenance staff is expedited to repair it. However, during the reparation at least, all terminal apparatuses 1 connected to the broken-down hub unit 4 have to wait for the reparation thereof, before retrieving communications. This causes great inconveniences. Especially, when the specialist is away, time of waiting for reparation becomes economically unsustainable. Therefore, the specialist is often obliged to stay day-long in working hours.

[0005] Thus, an object of the present invention is to provide a hub unit switching device used in network LAN that secures a communications function. By virtue of this device, when a hub unit breaks down, it can easily be repaired by non-maintenance staff and recover communications function.

[0006] To this end, there is provided a device for switching over hub units, the device being connected either to a first hub unit or to a second hub unit in an electrically interchangeable manner on the one hand, and adapted to connect to a plurality of terminal apparatuses on the other. The device and the first and second hub units respectively contain an equal number of device ports, first hub ports and second hub ports for entering or emitting data signals. The device for switching over hub units further comprises a unit-conversion switch. The device ports each contain a first, a second and a third connector. All the first connectors are connected to the first hub ports via first cables and all the second connectors connected to the second hub ports via second cables, whereas all the third connectors are adapted to connect to the terminal apparatuses via third cables. The third connectors each comprise a switching element and are adapted to be switched over either to the first connectors or to the second connectors. The unit-conversion switch controls all the switching elements, such that the terminal apparatuses can be switched over either to the first hub unit or to the second hub unit.

[0007] The device for switching over hub units may comprise a frame. Then, the unit-conversion switch may be provided outside the frame.

[0008] Further, the first, second and third connectors contained in the device ports may be differentiated by colours.

[0009] As one aspect of the invention, the unit-conversion switch may be connected in parallel with a remote control device. This remote control device contains a remote control switch, such that all the third connectors can be switched over either to the first connectors or to the second connectors.

[0010] Further, there is provided a wiring system comprising the above-mentioned device and at least one of the plurality of terminal apparatuses connected to the device via the third connectors.

[0011] The invention also relates to a method of using the device for switching over hub units, the device being further connected to at least one of the plurality of terminal apparatuses via the third connectors. The method comprises :

electrically connecting at least one of the plurality of terminal apparatuses to the third connectors via the third cables ;

electrically connecting the third connectors to the first connectors, so that the device for switching over hub units is connected to the first hub ports via the first cables ; and

switching over the unit-conversion switch, when a breakdown occurs in the first hub unit, so that the switching elements are switched over from the first connectors to the second connectors, whereby the device for switching over hub units is electrically connected to the second hub unit and the first hub unit is thus made ready for reparation.

[0012] In the above method, the unit-conversion switch may be electrically connected in parallel with a remote control device. This remote control device comprises a remote control switch capable of switching the switching elements, such that the device for switching over hub units is switched over either to the first hub unit or to the second hub unit.

[0013] The above, and other objects, features, advantages of the present invention will become apparent from the following description of the preferred embodiments, given as non-limiting examples, with reference to the accompanying drawings, and in which:

Fig.1 schematically shows terminals arranged on the same ranking basis in network LAN ;

Fig.2 schematically shows a terminal arrangement using a server in network LAN ;

Fig.3 shows the terminals connected to a hub unit ;

Fig.4 shows a wiring system which includes the device for switching over hub units according to the invention ;

Fig.5 shows the internal circuits contained in the device for switching over hub units according to the invention ;

Fig.6 shows the internal circuits contained in a remote control device according to another aspect of the invention ; and

Fig.7 schematically shows the device for switching over hub units connected to the remote control device via a public line.

[0014] Fig.4 shows a wiring system in which the device for switching over hub units according to a first embodiment of the present invention is applied. Fig.5 shows internal circuits of this device. In the internal circuits, as shown in Fig.4, a plurality of terminals 11 a to h can be connected interchangeably to a hub unit 13A or to a hub unit 13B via a device 12 for switching over hub units. Further, both hub units 13A and 13B are connected to a main line 15 via connection interfaces 14A and 14B such as a transceiver or a module.

[0015] The terminals 11 a to h mentioned above include computers or their peripherals such as a printer, which function for servers or clients. These terminals are also provided with standardised communications functions for 10BASE-T, token-rings, or the like.

[0016] Both the hub units 13A and 13B have a known structure in which each of connectors is wired into a star-like state. Both may have the same number of ports, e.g. 8 ports, which is the number used for a common type. For example, first hub unit 13A may be used every day and second hub unit 13B for emergency.

[0017] As shown in Fig.5, device 12 for switching over hub units comprises the same number of two-terminal relays 21 a to h (switching elements) as the hub ports in hub unit 13A or 13B, and the same number of coils 22 a to h. Device 12 further comprises a switch 24 for connecting or cutting an electrical source 23, a pilot lamp 25 for informing the state of switch 24, a lamp relay 26 for controlling, on an on-off basis, the source supply which is brought from electrical source 23 to pilot lamp 25 via interchanging switch 24 and device ports 27 a to h where internal circuits are led out from each contact point of two-terminal relays 21 a to h towards outside connections.

[0018] The device ports 27 a to h contained in device 12 for switching over hub units contain three series of modular jacks 27A a to h (A-modular jacks), 27B a to h (B-modular jacks) and 27C a to h (C-modular jacks), respectively, as shown in Figs.4 and 5. Amongst them, modular jacks 27A a to h (first series of connecting terminals) are connected to modular jacks 31 a to h contained in the first hub ports of first hub unit 13A. They are connected via twisted paired wire cables 32 a to h (first cables). Likewise, modular jacks 27B a to h (second series of connecting terminals) are connected to modular jacks 33 a to h contained in the second hub ports of second hub unit 13B. They are connected via twisted paired wire cables 34 a to h (second cables). On the other hand, modular jacks 27C a to h (third series of connecting terminals) can be connected to the modular jacks in terminals 11 a to h via twisted paired wire cables 35 a to h (third cables).

[0019] In order to make clear distinction when wiring, modular jacks 27A a to h, modular jacks 27B a to h and modular jacks 27C a to h in each of device ports 27 a to h of device 12 for switching over hub unit are painted in red, yellow and blue respectively.

[0020] The two-terminal relays 21 a to h in Fig.5 contain a contact-type electromagnetic relay element. In this element, electrically turned on or turned off state is established on the negatively charged side through mechanical contact, depending on whether the electric current from electric source 23 is supplied to coils 22 a to h. This is done by opening or closing switch 24. Coils 22 a to h are connected to one another in parallel, and then to electrical source 23 and switch 24. As to a pair of contact points A and B in two-terminal relays 21 a to h, contact point A is connected to A-modular jacks 27A a to h in device ports 27 a to h, whereas contact point B is connected to B-modular jacks 27B a to h in device ports 27 a to h. Contact point C is can be connected to C-modular jacks 27C a to h in ports 27 a to h and then to terminal apparatuses 11 a to h, respectively. They can be relayed to contact point A or B. As long as coils 22 a to h are cut off from electrical source 23, contact points C may be connected to contact points A, which are in turn connected to daily use first hub unit 13A. When coils 22 a to h are fed electrically, contact points C are swung to contact points B in auxiliary use second hub unit 13B.

[0021] As shown in Fig.4, switch 24 is arranged outside the frame front of device 12 for switching over hub units, and serves for opening or shutting the contact. For example, the front wall of the frame is provided with an oval-shaped slit 24a, into which switch knob 24b is fitted with enough play. This switch knob 24b is moved freely in slit 24a between upper position and bottom position (both viewed on Fig.4). The upper position signifies that switch 24 is open, i.e. connected to contact point A. Likewise, the bottom position signifies that switch 24 is shut, i.e. connected to contact point B. In the letters A and B mentioned above, those in switch 24 are designated in accordance with those in two-terminal relays 21 a to h as shown in Fig.5, so that both cases represent the same electrical state. Coils 22 a to h in two-terminal relays 21 a to h are supplied with electricity via source 23, only when switch 24 is closed, i.e. connected to contact point B.

[0022] As for the twisted paired wire cables 32 a to h, 34 a to h and 35 a to h which are connected to each of device ports 27 a to h in device 12 for switching over hub units, modular plugs are mounted thereto and serve as connectors. They are painted in a color chosen for each of the series of modular jacks 27A a to h, 27B a to h and 27C a to h in device ports 27 a to h. Usually, the modular plugs of twisted paired wire cables 32 a to h are painted in red as are A-modular jacks 27A a to h, those of twisted paired wire cables 34 a to h in yellow as are B-modular jacks 27B a to h, and those of twisted paired wire cables 35 a to h in blue as are C-modular jacks 27C a to h.

[0023] As electrical source 23 shown in Fig.5, alternating current with 100 V may be used for example. Fig.5 also shows fuse 37 and input terminals 38a and 38b for entering switch signals for remote control device 41 shown in Fig.6. Remote control device 41 is connected to external terminals 39a and 39b which send switching confirmation signals to remote control device 41.

[0024] Remote control device 41 switches on or off device 12 for switching over hub units by remote control. As shown in Fig.6, it further comprises a switch 42 for interchanging the contact between point A (open side) and point B (closed side), an open relay 43 which is switched off or on by opening or shutting switch 42, and a lamp 44 connected in parallel with open relay 43. Both ends of open relay 43 are connected to input terminals 38a and 38b and to a relay 26 for lamp and coils 22 a to h for two-terminal relays 21 a to h via input terminals 38a and 38b. The ends of lamp 44 are connected to external connection terminals 45a and 45b in series and to relay for lamp 26 via external terminals 39a and 39b. When switch 42 is closed at point B in remote control device 41, open relay 43 is put into the closed state, so that switch 24 of device 12 for switching over hub units is also switched. Relay 26 for lighting lamp in device 12 for switching over hub units is turned on. Pilot lamp 25 is fed electrically, and lamp 44 is also fed electrically via external connection terminals 45a and 45b. Consequently, by observing lamp 44 in remote control device 41, the state of device 12 for switching over hub units can be followed.

[0025] The wiring system including device 12 for switching over hub units are used as follows.

[0026] In normal states, communications are carried out via first hub unit 13A and corresponding connection interface 14A. Second hub unit 13B and corresponding connection interface 14B are therefore not in use. In this state, switch 24 in device 12 for switching over hub units shown in Fig.5 is connected to contact point A, i.e. internal circuits are cut, and there is no electric current in coils 22 a to h contained in two-terminal relays 21 a to h. Accordingly, all contact points C contained in two-terminal relays 21 a to h are connected to corresponding contact points A. Hence, in device ports 27 a to h contained in device 12 for switching over hub units, C-modular jacks 27C a to h are electrically connected to A-modular jacks 27A a to h. As a result, terminal apparatuses 11 a to h connected to C-modular jacks 27C a to h are connected to first hub unit 13A via two-terminal relays 21 a to h and A-modular jacks 27A a to h.

[0027] In this state, when making group communications among terminal apparatuses 11 a to h, data signals emitted from any one of these terminal apparatuses are passed through a corresponding twisted paired wire cable (series 35 a to h), C-modular jack contained in device ports (series 27 a to h), two-terminal relay (series 21a to h), device port (series 27 a to h) and twisted paired wire cable (series 32 a to h) and entered into a corresponding modular jack (series 31a to h) contained in the hub ports of primary use first hub unit 13A. Thus, the data signals may be entered from any one of terminal apparatuses 11 a to h into a corresponding modular jack (series 31 a to h). As first hub unit 13A contains a star-type wiring network, the signals are electrically connected and supplied to the other modular jacks of the hub ports. Then, the signals received at the other modular jacks may be passed through a corresponding twisted paired wire cable (series 32 a to h), A-modular jacks, two-terminal relay (series 21 a to h), C-modular jack and twisted paired wire cable (series 35 a to h), and addressed to the other terminal apparatuses (series 11 a to h). The addressed terminal apparatuses acknowledge the data signals and carry out the processing required.

[0028] When data signals are to be sent to another group of terminal apparatuses (communications outside the group) via main line 15, they are first sent to first hub unit 13A in the same manner as described above, then to main line 15 via connection interface 14A.

[0029] When short circuits or wire-cuts occur in primary use first hub unit 13A, thus disrupting communications inside and outside the group, first hub unit may be repaired urgently, as has been done in the past. However, it will take some time before knowing precisely the reasons for breakdown and repairing it. Moreover, if maintenance staff is away, it will be difficult for users, who are not maintenance specialists, to perform reparation.

[0030] In the wiring system according to an embodiment of the invention, switch 24 is preferably set up on the front frame of device 12 for switching over hub units, so that one only needs to shift the switch from contact point A where the circuit is open, to contact point B where the circuit is closed.

[0031] In device 12 for switching over hub units shown in Fig.5, electric current is supplied from electrical source 23 into coils 22 a to h contained in two-terminal relays 21 a to h by closing switch 24. Then, by virtue of electromagnetically induced forces, contact points C contained in two-terminal relays 21 a to h are switched over from contact points A to contacts points B. In this way, C-modular jacks 27C a to h contained in device ports 27 a to h of device 12 are electrically cut from A-

modular jacks 27A a to h which are connected to first hub unit 13A. Instead, they are swung to B-modular jacks 27B a to h which are connected to second hub unit 13B. Accordingly, terminal apparatuses 11 a to h become connected to second hub unit 13B via twisted paired wire cables 35 a to h, C-modular jacks 27C a to h contained in device ports 27 a to h of device 12 for switching over hub units, two-terminal relays 21 a to h, B-modular jacks 27B a to h, and twisted paired wire cables 34 a to h. As a result, communications among terminal apparatuses 11 a to h in the same group, as well as ones outside the group which are performed via main line 15, are conducted via device 12 for switching over hub units and second hub unit 13B.

[0032] In this state, first hub unit 13A is totally cut off from use, thereby removing any effect which would be caused by breakdown. Therefore, for the maintenance staff to repair the unit, there is no need to shut down communications function. He can repair it when he has time.

[0033] Switching from contact point A to contact point B can be done by simply moving switch 24. It can be done by a person other than the maintenance staff. There is no time lost between a breakdown of first hub unit 13A and retrieval of communications function. Moreover, anyone can handle easily and swiftly in order to recover the communications function after the breakdown.

[0034] Further, if using remote control device 41, when switch 42 therein is positioned at contact point B (closed side), open relay 43 is put into the closed state, resulting in a state in which switch 24 in device 12 for switching over hub units is turned. Further, when relay 26 for lighting lamp in device 12 is turned on, electric current is passed into pilot lamp 25 and, via external connection terminals 45a and 45b, into lamp 44. The state of device 12 for switching over hub units can thus be checked by lamp 44 contained in remote control device 41.

[0035] Fig.6 shows, as an example, a system in which the electrical source is derived from device 12 for switching over hub units. Instead, remote control device 41 itself may contain such an electrical source.

[0036] Further, to make the best use of the maintenance effect deriving from remote control device 41, the latter and device 12 for switching over hub units may be connected to public line 52 via modem 51, as shown in Fig.7. In this way, when engineers are away, for example, for branch offices, a specialist in the headquarters can perform the maintenance for those branches from afar. As a result, only a limited number of engineers may be staffed for many a number of branch offices. Moreover, time loss can be virtually eliminated.

[0037] In the above embodiments, device 12 for switching over hub units utilizes two-terminal relays 21 a to h having contact points. However, solid state relays having no contact points may also be used in combination, so as to form two-terminal relays in which terminal A and terminal B can be switched over. If the two-terminal relays are designed so as to secure reliability in high speed use, they can be used in high speed network systems.

[0038] Further, hub units 13A and 13B are described as having 8 ports. However, they may contain 4 ports, or any other appropriate number.

[0039] According to one aspect of the invention, in normal state, the first connector contained in each of the device ports is electrically connected to each of the hub ports contained in the first hub unit via a corresponding first cable. Then, the second connector contained in each of the device ports is electrically connected to each of the hub ports contained in the second hub unit via a corresponding second cable.

[0040] Further, the third connector contained in each of the device ports can be electrically connected to each of the terminal apparatuses via a corresponding third cable.

[0041] Then, each of the third connectors is electrically connected, by virtue of a unit-conversion switch, either to each of the corresponding first connectors or to each of the corresponding second connectors by switching each of the corresponding switching elements, whereby, when a breakdown occurs in the hub unit connected either to the first connectors or to the second connectors, the third connection terminals can be switched over to the other connectors by switching each of the switching elements by virtue of the unit-conversion switch, so that the hub unit in breakdown may be repaired without hurry, and without interrupting communications.

[0042] Also, switching can be done very easily, without having recourse to maintenance specialists. There is little handling required or little time lost between the breakdown of first hub unit and the recovering of the communications function. Moreover, the recovering of communications can be done swiftly by anyone.

[0043] Further, the unit-conversion switch may be provided outside the frame of the device for switching over hub units, so that handling of the unit-conversion switch is rendered even easier.

[0044] Furthermore, the first, second and third connectors in the device ports are differentiated by color, so that wiring error is easily avoided.

[0045] In addition the unit-conversion switch in the device 12 for switching over hub units may be connected in parallel with a remote control device and the latter may be equipped with a remote control switch which is similar to the unit-conversion switch. By operating this remote control switch, the third connectors can easily be switched over from afar, from the first connectors to the second connectors, or vice versa.

Claims

1. A device (12) for switching over hub units, characterised in that said device is connected either to a

first hub unit (13A) or to a second hub unit (13B) in an electrically interchangeable manner, and adapted to connect to a plurality of terminal apparatuses (11 a to h), said device and said first and second hub units respectively containing an equal number of device ports (27 a to h), first hub ports (31 a to h) and second hub ports (33 a to h) for entering or emitting data signals, said device for switching over hub units further comprising a unit-conversion switch (24), said device ports each containing a first, second and third connector (A, B and C), all said first connectors connected to said first hub ports via first cables 32 a to h), all said second connectors connected to said second hub ports via second cables (34 a to h), all said third connectors adapted to connect to said terminal apparatuses via third cables (35 a to h), said third connectors each comprising a switching element and being adapted to be switched over either to said first connectors or to said second connectors, said unit-conversion switch controlling all said switching elements, such that said terminal apparatuses can be switched over either to said first hub unit or to said second hub unit.

2. The device according to claim 1, wherein said device (12) for switching over hub units comprises a frame, and said unit-conversion switch is provided outside said frame.

3. The device according to claim 1 or 2, wherein said first, second and third connectors (A, B and C) contained in said device ports (27 a to h) are differentiated by colours.

4. The device according to any one of claims 1 to 3, wherein said unit-conversion switch (24) is connected in parallel with a remote control device (41) and said remote control device contains a remote control switch (42), such that all said third connectors (C) can be switched over either to said first connectors (A) or to said second connectors (B).

5. A wiring system comprising the device (12) for switching over hub units as defined in any one of claims 1 to 4, and at least one of said plurality of terminal apparatuses (11 a to h) connected to said device for switching over hub units via said third connectors (C).

6. A method of using the device (12) for switching over hub units according to any one of claims 1 to 4, said device being further connected to at least one of said plurality of terminal apparatuses via said third connectors, said method comprising :

electrically connecting said at least one of said plurality of terminal apparatuses (11 a to h) to said third connectors (C) via said third cables (35 a to h) ;

electrically connecting said third connectors to said first connectors (A), so that said device (12) for switching over hub units is connected to said first hub ports (31 a to h) via said first cables (32 a to h) ; and

switching over said unit-conversion switch (24), when a breakdown occurs in said first hub unit (13A), so that said switching elements are switched over from said first connectors (A) to said second connectors (B), whereby said device for switching over hub units is electrically connected to said second hub unit (13B) and said first hub unit is made ready for reparation.

7. The method according to claim 6, said method further comprising the step of using said remote control switch (42) for switching said switching elements, such that said device (12) for switching over hub units is switched over either to said first hub unit (13A) or to said second hub unit (13B).

Fig.1

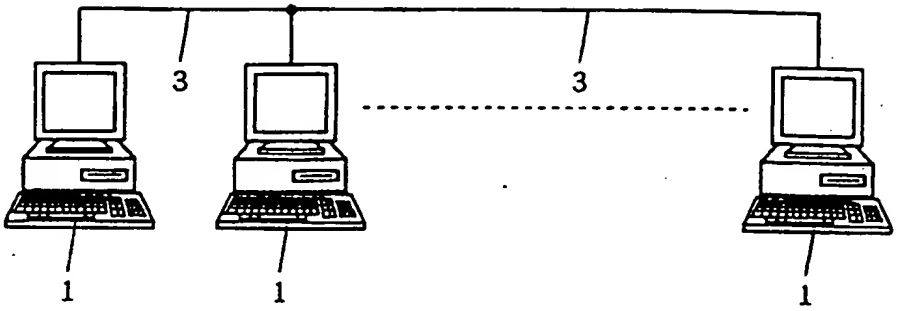


Fig.2

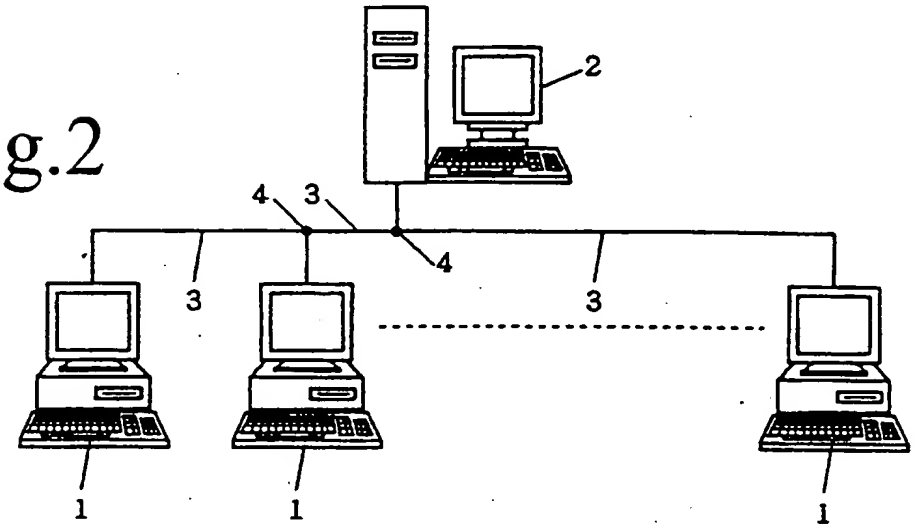


Fig.3

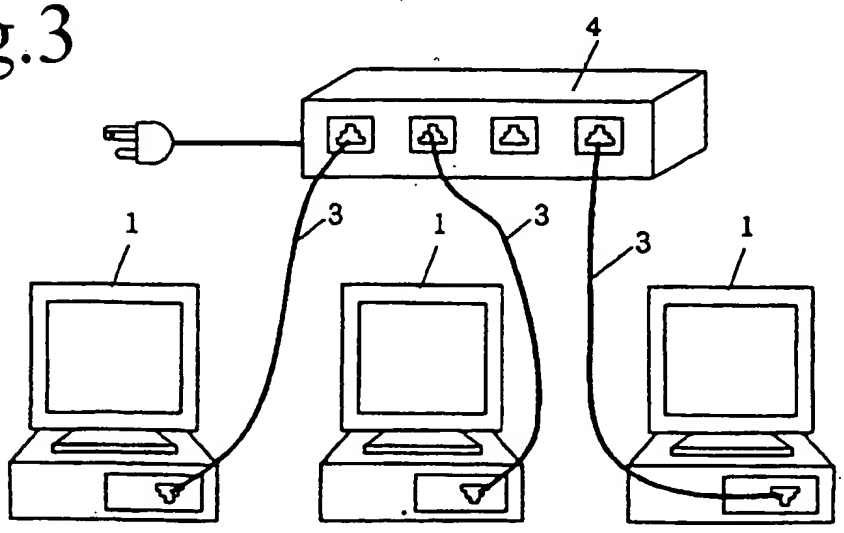


Fig.4

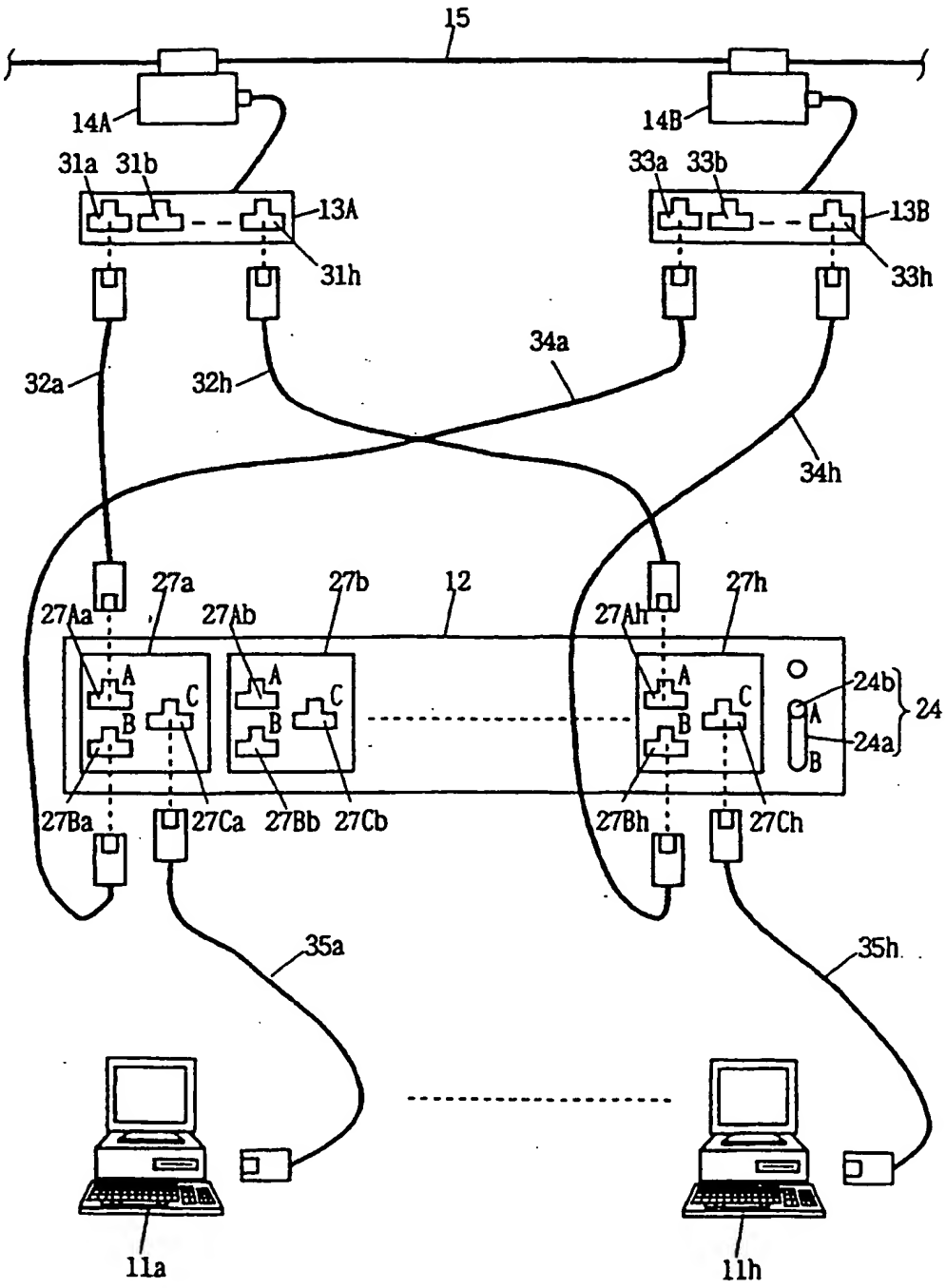

15
14A
14B
31a 31b
33a 33b
13A
13B
31h
33h
32a
32h
34a
34h
27a
27b
12
27h
27Aa
27Ab
27Ah
A
B
C
24b
24a
24
27Ba
27Ca
27Bb
27Cb
27Bh
27Ch
35a
35h
11a
11h

Fig.5

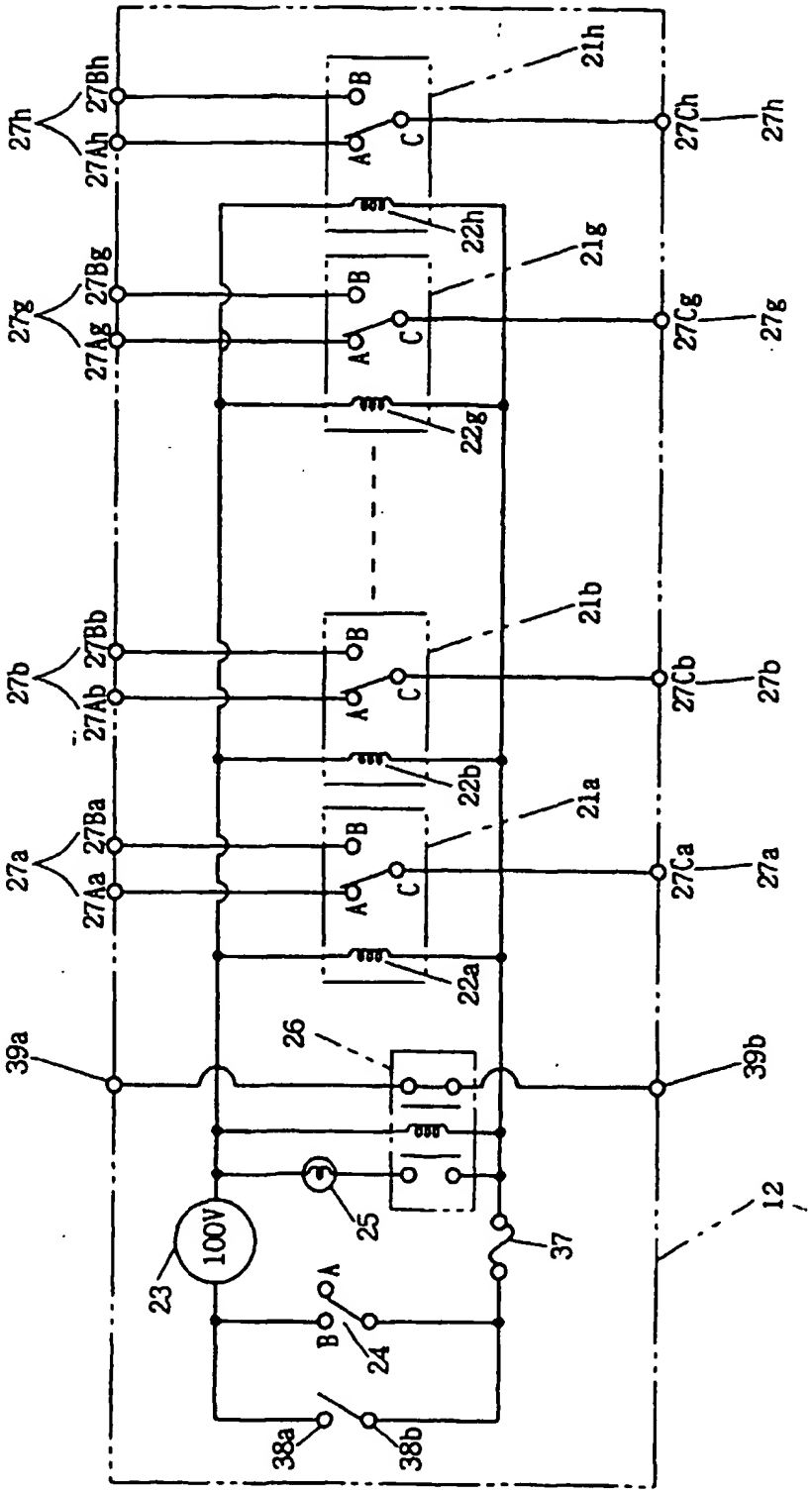

27h
27Bh
27Ah
21h
22h
27Ch
27g
27Bg
27Ag
21g
22g
27Cg
27b
27Bb
27Ab
21b
22b
27Cb
27a
27Ba
27Aa
21a
22a
27Ca
39a
26
39b
12
100V
23
25
37
A
B
24
38a
38b

Fig.6

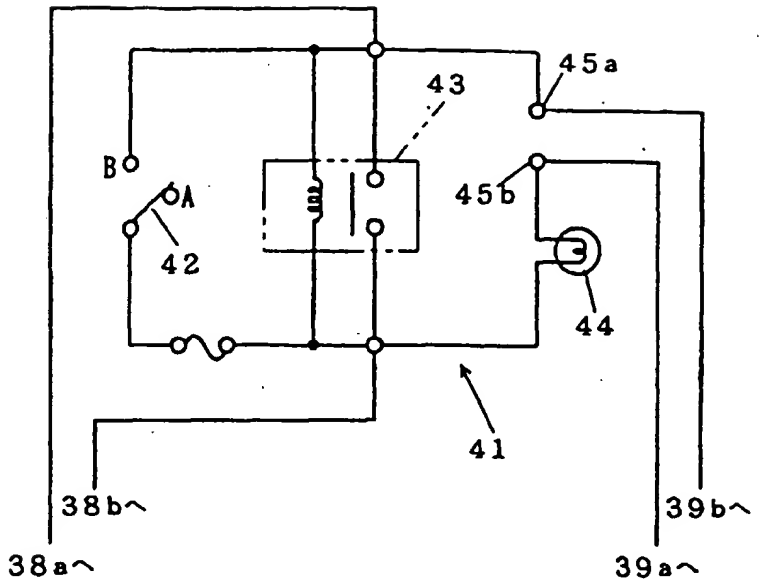
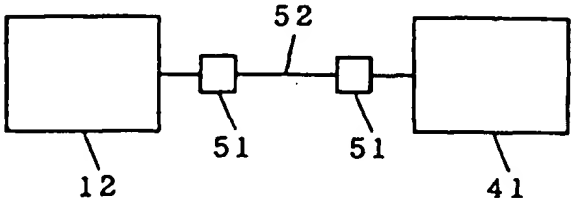


Fig.7



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 40 3041

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	PATENT ABSTRACTS OF JAPAN vol. 097, no. 007, 31 July 1997 & JP 09 083560 A (NEC CORP), 28 March 1997	1,5,6	H04L12/44 H04L29/14
Y	* abstract *	3,4,7	
A		2	
Y	EP 0 415 647 A (AMERICAN TELEPHONE & TELEGRAPH) 6 March 1991 * page 5, line 39 - line 42 *	3	
Y	US 4 670 873 A (COUR JEAN-MICHEL ET AL) 2 June 1987 * column 4, line 9 - line 26 *	4,7	
A	US 5 115 449 A (LOCKYER TERENCE D ET AL) 19 May 1992 * column 3, line 66 - column 6, line 13 *	1,5,6	
A	"X21 AUTOMATIC BACK-UP ON SWITCHED LINE" IBM TECHNICAL DISCLOSURE BULLETIN, vol. 38, no. 11, 1 November 1995, pages 173-176, XP000547337 * page 173, line 1 - line 13 *	2	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
H04L
H04B
H01H
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 March 1999	RAMIREZ DE AREL.., F

CATEGORY OF CITED DOCUMENTS
X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 40 3041

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-03-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0415647 A	06-03-1991	US 5150246 A	22-09-1992
		AU 623548 B	14-05-1992
		AU 6194590 A	13-06-1991
		CA 2023711 A,C	01-03-1991
		CN 1049945 A,B	13-03-1991
		DE 69029549 D	13-02-1997
		DE 69029549 T	24-04-1997
		DK 415647 T	03-03-1997
		ES 2095238 T	16-02-1997
		HK 46097 A	18-04-1997
		JP 2511565 B	26-06-1996
		JP 3092044 A	17-04-1991
		MX 167117 B	04-03-1993
		NO 303758 B	24-08-1998
US 4670873 A	02-06-1987	FR 2534753 A	20-04-1984
US 5115449 A	19-05-1992	GB 2232859 A,B	19-12-1990
		US 5387902 A	07-02-1995

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82